

# Intentional Gesturing During Encoding Enhances Retrieval

Stephani Foraker, Department of Psychology

forakesm@buffalostate.edu

## Abstract

**Does intentional gesturing during encoding enhance memory?** We investigated whether recall was better when unassociated word pairs (cookie-garage) were just repeated, repeated while generating an image or repeated while generating gestures to relate the words. Cued recall immediately and two days later revealed that imagery and gesturing enhanced memory over repetition, although gesturing was noticeably less effective than imagery. These results provide the first demonstration that intentional rather than incidental gesturing during encoding enhances retrieval.

## Background

**Mental Imagery** is a well-studied mnemonic that increases elaboration at encoding, distinctiveness in memory, and provides a robust retrieval cue.

- superior to simple **repetition** e.g., Schnorr & Atkinson, 1969
- Dual-coding hypothesis Paivio, 1971

**Gesturing** could be an effective encoding format because it encourages generation of internal visual representations.

- Alibali et al., 1999; McNeill, 1992; Melinger & Levelt, 2004

Gestures as simulated action

- Hostetter & Alibali, 2010

Little research addresses how gesturing during encoding affects later recall. One study has found that gesturing improved surprise free recall of event descriptions.

- superior to speech alone
  - Cook, Yip & Goldin-Meadow, 2010
- for both spontaneous & instructed gesturing

➤ We addressed the effectiveness of gesturing as an **intentional** encoding strategy.

➤ We directly compared visual imagery and gesturing.

### Competing predictions:

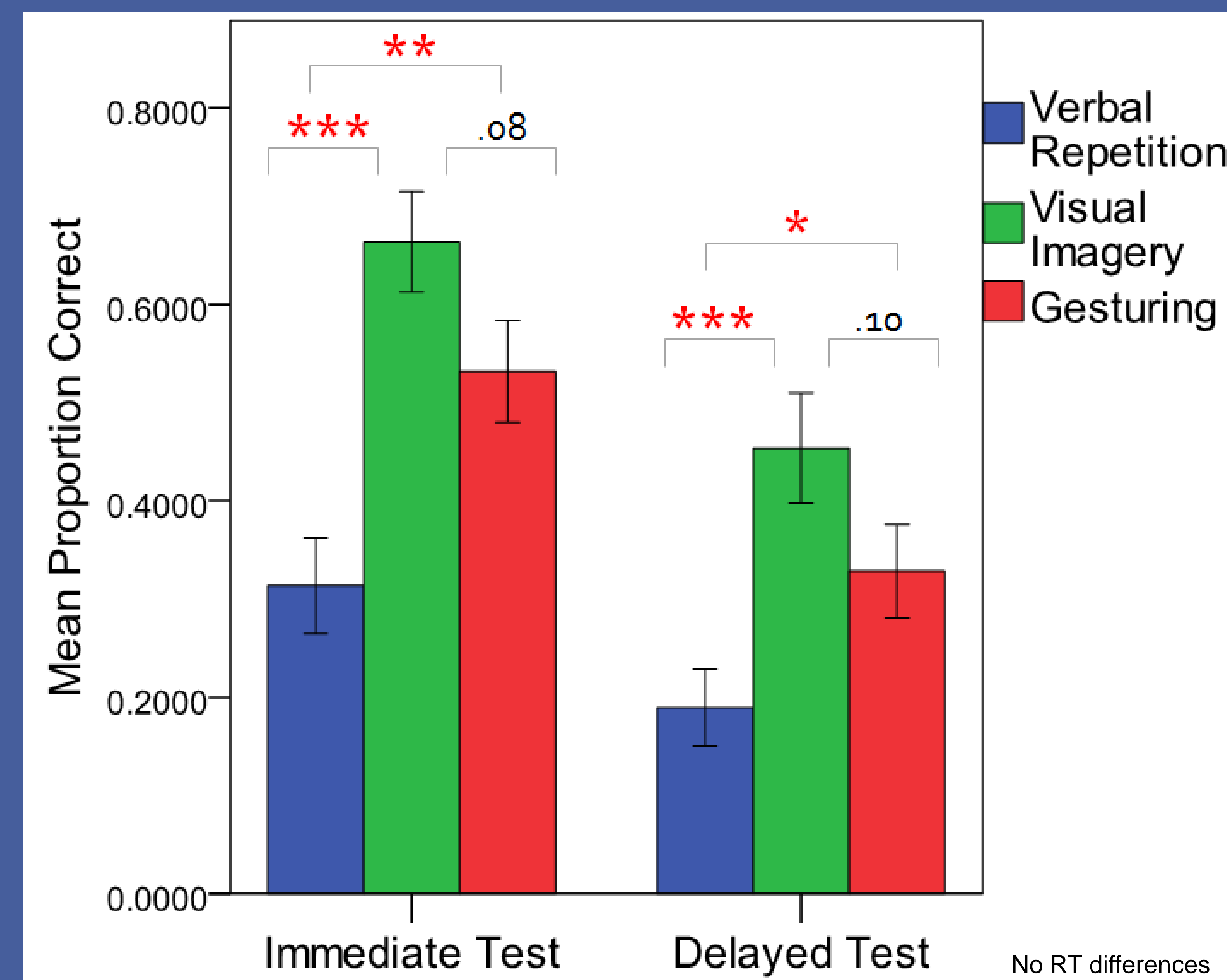
**Gesturing** better than **Imagery**

- **Externalized imagery**: hand gestures are based on internal visualized or simulated representations that are externalized
- **Additional mode**: extending the dual coding principle, additional representational formats should help (kinesthetic, externally visual)

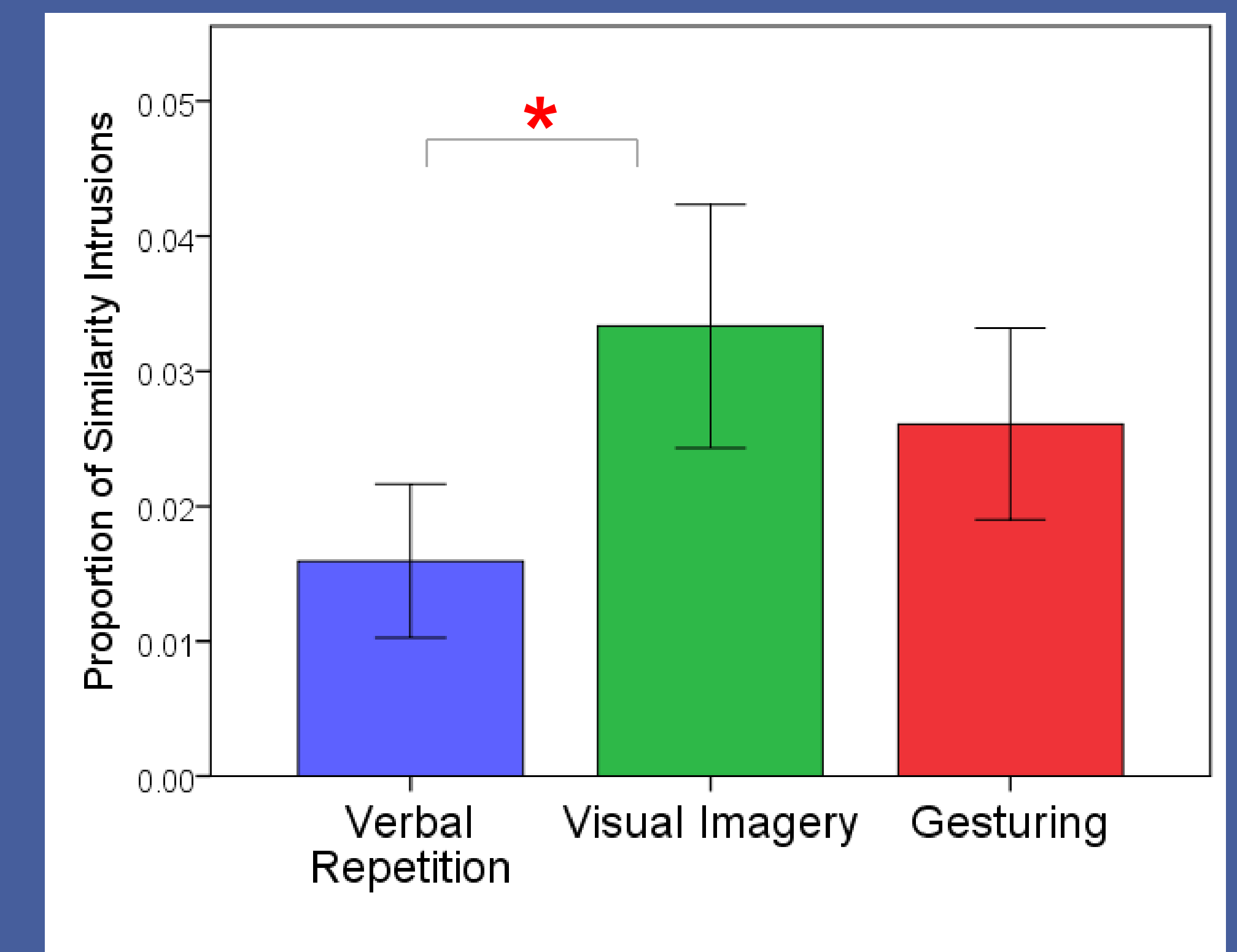
**Imagery** better than **Gesturing**

- **Distinctiveness**: imagery may provide a more detailed, richer representation, while illustrative gestures may not be as distinctive or specific, creating interference or vagueness between items
- **Cognitive load**: generating helpful gestures intentionally may be less practiced or fluent than imagery, especially for a novel association

## Results



## Similarity Intrusions



Similarity intrusions at both test times were more prevalent for imagery and gesturing groups, but the items tended to be different.

**Imagery** errors: *spoon* for *fork*, *thread* for *yarn*, *garbage* for *trash*

**Gesturing** errors: *desk* for *table*, *table* for *desk*, *sniff/smell* for *nose*, *sand* for *ash*

## Method

Learning phase: word pair learning task

- 3 encoding strategies
- between-subjects, 33 in each group
- 20 seconds to encode each pair
  - **Repetition**: “repeat the words over and over in your mind to associate them with each other”
  - **Imagery**: “(repeat word pairs) + form an image in your mind of those two things in some relationship”
  - **Gesturing**: “(repeat word pairs) + illustrate or act out each of the words in some relationship with your hands and body, like in charades”
- 2 practice trials, with modeling

Materials: unassociated word pairs

- concrete nouns that could be imagined or gestured
- 30 pairs, normed associative rating 1.30 (1-7 scale)
- cat-hose, door-kite, statue-zipper, lava-carrot, jar-sock

Test phase: cued recall

- Immediate (minutes later) & Delayed (2 days later)
- within-subjects
- no instruction at recall

## Conclusions

Imagery and Gesturing were more effective encoding strategies than simple repetition, providing more durable cues at recall. The same overall pattern was found for both immediate and delayed tests.

Mental imagery was superior to gesturing as an intentional encoding strategy. There are likely several reasons for this.

- The **similarity errors** for the gesturing and imagery conditions indicate that gestures may not be optimal for discriminating similar **action or object properties**, like *table* versus *desk*.
- Gesturing may also add **extraneous cognitive load**, which several participants reported.
- Mental imagery is probably richer, more flexible, more familiar, and more automatic.

We are currently investigating several potential differences between imagery and gesturing as encoding strategies and mnemonic devices.

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